CLAIMS

1. An optical element for controlling a phase and an amplitude of emerging rays by a multilayer film, wherein a wavefront phase of the emerging rays is adjusted by cutting away the multilayer film in accordance with an amount of adjustment of the wavefront phase.

2. An optical element, wherein the multilayer film is formed for reflection in a number of cycles larger than that necessary to substantially saturate a reflectance.

3. An optical element according to claim 1 or 2, wherein the optical element is used for soft X-rays, and the multilayer film is formed of molybdenum layers and silicon layers.

4. An optical element for controlling a phase and an amplitude of emerging rays by a multilayer film, comprising a correction film that is disposed on the multilayer film and composed of a material having a large difference (1 - n) between an refractive index n to incident rays and 1 as well as having a small extinction coefficient k to the incident rays, wherein a wavefront phase is adjusted by cutting away the correction film and the multilayer film in accordance with an amount of adjustment of the wavefront phase.

5. An optical element according to claim 4, wherein the multilayer film is formed for reflection in a number of cycles larger than that necessary to substantially saturate a reflectance.

6. An optical element according to claim 4 or 5, wherein the optical element is used for soft X-rays, and the correction film uses one of molybdenum, ruthenium, rhodium, and beryllium or a combination thereof.

7. An optical element according to claim 6, wherein the multilayer film is formed of molybdenum layers and silicon layers.

8. An optical element forming method, comprising the steps of forming a multilayer film on a substrate to control a phase and an amplitude of emerging rays, and adjusting a wavefront phase of the emerging rays by cutting away the multilayer film in accordance with an amount of adjustment of the wavefront phase.

9. An optical element forming method according to claim 8, wherein the multilayer film is formed in a number of cycles larger than that necessary to saturate a reflectance.

10. An optical element forming method according to claim 8 or 9, wherein cutting-away of the multilayer film is controlled

by detecting a difference between a plurality of materials that forms the multilayer film.

11. An optical element forming method, comprising the steps of forming a multilayer film on a substrate in a number of cycles larger than that necessary to saturate a reflectance, further forming a correction film on the multilayer film, and cutting away the correction film or the correction film and the multilayer film in accordance with an amount of adjustment of a wavefront phase of emerging rays.

12. A microscope using an optical element according to any of claims 1 to 7.

13. An exposure apparatus using an optical element according to any of claims 1 to 7.

14. A telescope using an optical element according to any of claims 1 to 7.

15. A microprobe using an optical element according to any of claims 1 to 7.

16. An analyzer using an optical element according to any of claims 1 to 7.

17. A laser oscillator using an optical element according to any of claims 1 to 7.

18. A Fabry-Perot interferometer using an optical element according to any of claims 1 to 7.

19. A ring laser gyro apparatus using an optical element according to any of claims 1 to 7.